

REMARKS

Applicants submit these remarks in response to the Office Action dated March 24, 2006 ("Office Action"). This Response is filed prior to the three-month deadline. Accordingly, it is believed that no fees are necessary

Applicants submit the above amendments to expedite allowance of the subject application. It is believed that the amendments should raise no significant new issues. Accordingly, Applicants respectfully request that the amendments be entered.

Claims 1-27 are pending in the application. Independent Claims 1, 23, 26 and 27 have been amended to recite that each pattern represents a compound selected from a database of compounds and that mapped patterns are displayed. These revisions are supported throughout the specification:

Paragraph [00086] on page 28 of Applicants' specification provides for the display of projected input point on a display map.

Accordingly, the amendment to the independent claims is fully supported by the specification and entry thereof is proper and respectfully requested. No new matter is introduced.

Claims 1-27 were rejected under 35 U.S.C §101 as allegedly directed to non-statutory subject matter.

Applicants note with appreciation the indication on page 30 of the Office Action that a good attempt was made in the prior reply to comply with 35 U.S.C §101. While Applicants disagree with the position taken in the Office Action that more refinements are necessary, Applicants have revised the claims to recite in the body of the claims that each pattern represents a compound selected from a database of compounds and added that the mapped patterns are displayed.

The Law

Mathematical algorithms are not patentable subject matter only to the extent that they are merely abstract ideas since, standing alone, certain types of mathematical subject matter "represent nothing more than abstract ideas until reduced to some type of practical application, i.e., 'a useful, concrete and tangible result.'" *State Street Bank & Trust v. Signature Financial Group, Inc.*, 149 F.3d 1368

(Fed. Cir. 1998) (citing *In re Alappat*, 33 F.3d 1526 (Fed. Cir. 1994)). “Unpatentable mathematical algorithms are identifiable by showing they are merely abstract ideas constituting disembodied concepts or truths that are not ‘useful.’ From a practical standpoint, this means that to be patentable an algorithm must be applied in a ‘useful’ way” and “[t]he mere fact that a claimed invention involves inputting numbers, calculating numbers, outputting numbers, and storing numbers, in and of itself, [does] not render it nonstatutory subject matter.” *Id.* at 1373-74.

In holding that a patent’s claims to a method for enhancing a long distance telephone call message record by adding a data field with information on the long distance provider of the call recipient fell “comfortably within the broad scope of patentable subject matter,” the Federal Circuit noted that “[b]ecause § 101 includes processes as a category of patentable subject matter, the judicially defined proscription against patenting of a ‘mathematical algorithm,’ to the extent such a proscription still exists, is narrowly limited to mathematical algorithms in the abstract.” *AT&T Corp. v. Excel Communications, Inc.*, 172 F.3d 1352 (Fed. Cir. 1999).

In *State Street*, the Federal Circuit explained that “the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces ‘a useful, concrete and tangible result’ – a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades.” *Id.* For comparative purposes, Applicants note that the independent claim at issue in *State Street* reads:

A data processing system for managing a financial services configuration of a portfolio established as a partnership, each partner being one of a plurality of funds, comprising:

- (a) computer processor means for processing data;
- (b) storage means for storing data on a storage medium;
- (c) first means for initializing the storage medium;

- (d) second means for processing data regarding assets in the portfolio and each of the funds from a previous day and data regarding increases or decreases in each of the funds, assets and for allocating the percentage share that each fund holds in the portfolio;
- (e) third means for processing data regarding daily incremental income, expenses, and net realized gain or loss for the portfolio and for allocating such data among each fund;
- (f) fourth means for processing data regarding daily net unrealized gain or loss for the portfolio and for allocating such data among each fund; and
- (g) fifth means for processing data regarding aggregate year-end income, expenses, and capital gain or loss for the portfolio and each of the funds.

Applicants respectfully point out that no “output” step resulting in a physical transformation outside the computer was recited in the issued claims.

The law makes it clear that “[o]nly when the claim is devoid of any limitation to a practical application in the technological arts should it be rejected under 35 U.S.C. § 101.” M.P.E.P. § 2106(II)(A). “To be statutory, a claimed computer-related process must either: (A) result in a physical transformation outside the computer for which a practical application in the technological arts is either disclosed in the specification or would have been known to a skilled artisan, or (B) be limited to a practical application within the technological arts.” M.P.E.P. § 2106(IV)(B)(2)(b). The M.P.E.P. at § 2106(IV)(B)(2)(b)(ii) also illustrates why the claims such as those pending are drawn to statutory subject matter:

A computer process that simply calculates a mathematical algorithm that models noise is nonstatutory. However, a claimed process for digitally filtering noise employing the mathematical algorithm is statutory.

Claim 1

Independent claim 1 of the instant application reads:

A method of mapping a set of input patterns to an m -dimensional space, wherein each pattern represents a compound selected from a database of compounds, the method comprising the steps of:

- (a) selecting k patterns from said set of input patterns to form a subset of patterns $\{p_i, i = 1, \dots, k\}$ wherein each pattern represents a compound selected from a database of compounds;
- (b) determining at least some pairwise relationships between at least some of the patterns in said subset of patterns $\{p_i\}$
- (c) mapping the patterns $\{p_i\}$ into a set of images in an m -dimensional space $\{p_i \rightarrow y_i, i = 1, 2, \dots, k, y_i \in R^m\}$ so that at least some of the pairwise distances between at least some of the images $\{y_i\}$ are representative of the relationships of the respective patterns $\{p_i\}$;
- (d) determining a set of n attributes for each pattern in said subset of patterns $\{p_i\}$ $\{x_i, i = 1, 2, \dots, k, x_i \in R^n\}$;
- (e) forming a training set $T = \{ (x_i, y_i), i = 1, 2, \dots, k \}$;
- (f) using a supervised machine learning technique to determine a mapping function based on the training set T ; and
- (g) using said mapping function determined in step (f) to map additional patterns; and displaying mapped patterns..

To carry out the mapping, Applicants claimed invention does indeed, to some extent, employ a mathematical algorithm. However, this alone is not determinative of whether the claims are directed to statutory subject matter. As explained above, the Examiner is required to determine whether the claimed invention “merely manipulates an abstract idea” or “is limited to a practical application of the abstract idea or mathematical application in the technological arts.”

As apparent from reading Applicants’ specification, the presently claimed method has at least one practical application within the technological arts. Therefore, analogous to the claims at issue in *State Street* and consistent with the example from the M.P.E.P. set forth above, independent claim 1 is proper under 35 U.S.C. § 101 without reciting a particular physical transformation outside the computer.

For example, in paragraphs [00039] and [00040] on page 12, Applicants’ specification refers to the phrase “input patterns” as follows:

“According to the method of the invention, at least some of all possible pairs of objects (patterns) from a selected plurality of objects are compared, and the resulting pairwise relationships are recorded in a database. As would be apparent to one skilled in the relevant art given the discussion herein, there are a number of approaches that can be taken in accordance with the method of the invention to select objects to be compared.

When applying the method of the invention to the field of molecular similarity, for example, one approach for selecting objects (compounds) is to judiciously select a subset of diverse objects (compounds) that would serve to define a reasonable compound space for similarity/dissimilarity analysis. In an embodiment, a subset of about 100-1000 diverse compounds can be selected for pairwise comparison.”

Moreover, paragraph [00044] on page 14 of Applicants’ specification provides:

“This second selection approach can be used, for example, in the field of molecular similarity to mine a database of compounds and identify compounds similar to compounds having known therapeutic, agricultural or other commercial value. As described herein, the compounds selected from the database can be multidimensionally scaled to an m-dimensional vector space and used to determine one or more nonlinear mapping functions. These mapping functions can then be used to map other compounds in the same or a different database to the m-dimensional vector space in order to determine which compounds in the database may be commercially valuable. Compounds having known therapeutic, agricultural or other commercial value can be selected and mapped to the m-dimensional vector space to identify particular areas or regions of importance. New compounds which map to the same area or region of the m-dimensional vector space as the compounds having known commercial or therapeutic value are likely to be similar to the compounds having the known commercial therapeutic, agricultural or other commercial value.”

For the reasons set forth above, Applicants believe that pending claims 1-27 are directed to statutory subject matter. Accordingly, withdrawal of the rejections under sections 101 and 112 first paragraph is respectfully requested.

Claims 1-27 were rejected under 35 U.S.C 102(b) as allegedly anticipated by *Arsalan*, The BP Neural Networks With Data Clustering Enhancement-An emerging Optimization Tool, Proceedings

if the 1996 IEEE International Symposium on Intelligent Control, Dearborn, MI, September 15-18, 1996, pp 188-193. This rejection is traversed in as much as it is applied to the present claims.

A reference is only good for what it clearly and definitely discloses. As noted by the Federal Circuit, anticipation under 35 U.S.C. § 102 occurs only “when the same device or method, having all of the elements contained in the claim limitations, is described in a single prior art reference.” *Crown Operations International, Ltd. v. Solutia, Inc.*, 289 F.3d 1367 (Fed. Cir. 2002). “A single prior art reference anticipates a patent claim if it expressly or inherently describes each and every limitation set forth in the patent claim.” *Trintec Industries, Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292 (Fed. Cir. 2002). Moreover, the “single reference must describe the claimed invention with sufficient precision and detail to establish that the subject matter existed in the prior art.” *Verve, LLC v. Crane Cams, Inc.*, 311 F.3d 1116 (Fed. Cir. 2002). See also *In re Spada*, 911 F.2d. 705, 708 (Fed. Cir. 1990) (stating that “the reference must describe the applicant’s claimed invention sufficiently to have placed a person of ordinary skill in the field of the invention in possession of it.”); *PPG Indus., Inc. v. Guardian Indus., Corp.*, 75 F.3d 1558 (Fed. Cir. 1996) (“To anticipate a claim, a reference must disclose every element of the challenged claim and enable one skilled in the art to make the anticipating subject matter.”).

Arsalan does not disclose each feature of the present claims. *Arsalan* does not relate to mapping patterns that represent compounds selected from a database of compounds. *Arsalan* cannot and does not suggest, much less disclose, determining pairwise relationships between patterns representing compounds and displaying the mapped patterns. *Arsalan* purports to examine enhancements to back-propagation neural networks to use them efficiently in optimization problems (Abstract).

Accordingly, Withdrawal of the rejection is respectfully requested.

CONCLUSION

In view of the above amendments and remarks, it is believed that claims 1-27 now under consideration in the application are in condition for allowance and such favorable action is earnestly solicited.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read "Samir Elamrani", written in a cursive style.

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